MARINE OUTLOOKS SURVEY

Potential for Tug-Barge Services on the Great Lakes

Ontario

Ministry of
Transportation

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POTENTIAL FOR TUG-BARGE SERVICES ON THE GREAT LAKES

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MINISTRY OF TRANSPORTATION
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BACKGROUND:

Frequently we are approached regarding expansion of tug-barge services on the lakes.

In response, Mr. Wm. Jones of this Ministry carried out a literature search and survey to determine if "there is potential for a detailed evaluation, both economic and technical, of Great Lakes tug-barge services".

This report details the findings and conclusions of the work completed in November, 1987.

OVERALL:

1. There are thirteen tug-barge operations currently on the Great Lakes, hence feasibility is not in doubt. However, since many of the current operations are integrated with specialized needs of the parent company, it is not clear if their experience supports a more general application of tug-barge services at this time.

2. The main impediments to new tug-barge projects are; competition from other modes, identification of market niche and dedication to the traditional forms of lake transport.

3. Because of these factors no public policy or programmes are necessary, however, the Marine Office would consider participation in evaluations of any specific Ontario-based tug-barge proposals.

STUDY DISTRIBUTION:

We are circulating copies of the report to all contributors and to interested parties to:

1. Provide information which might assist in business planning, and,

2. Invite comments and suggestions on further action in this area.

Marine Office
Ministry of Transportation
Province of Ontario

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1. PURPOSE

- To determine whether there is potential for a detailed evaluation, both economic and technical, of Great Lakes tug and barge services or the evidence is still against this type of service on the lakes.

2. METHODOLOGY

- Literature search; various reports and periodicals reviewed (Attachments # 1 and 2).
- Telephone interviews with industry and government sources in Canada and the United States (Attachment #5).

3. FINDINGS

a) Technical Feasibility

- Tug-barges are technically feasible, although many people (particularly on Canadian side), are still uncertain about their seaworthiness in the stormy open waters of the Great Lakes (short, steep wave conditions), especially during winter.

- Great Lakes tug-barge operators claim tug-barges are restricted like a conventional ship in very bad weather; more important to be able to anticipate the weather in order to determine when to push and when to pull the barge (push in open, calm waters with waves less than 4-6 feet and in confined areas such as harbours and canals).

- Several companies use ice reinforced barges; one operates year-round between Lakes Huron, Michigan and Erie.

- Tug-barge services were more prevalent in the Great Lakes in the past, many were converted sailing ships and steamers; they were largely replaced by self-propelled vessels and land transportation.

- Existing tug-barge services on the Great Lakes are primarily first generation systems, although several companies (Canonie, Amoco, Hannah and St. Mary's) are using second generation tug-barge systems (see Attachment #1).

a) **Technical Feasibility** (Continued)

- Traditional push and pull tug barges considered as having limited effectiveness; may have additional costs of second tug requirements in confined areas and higher insurance rates than for conventional vessels.

- New technological developments such as semi-rigid, flexible joining systems (e.g., Flexor couplings) and modern, integrated tug-barges appear promising, but are not tested on the Great Lakes (See Attachment #2)

- Potential for converting laid-up conventional ships to barges; 2-3 firms examining this possibility.

b) **Economic Feasibility**

- Opinion divided on the economic feasibility of tug-barge services on the Great Lakes; more optimism on American side.

- Several carriers feel that tug-barges are not economically feasible as they are too slow, cannot compete with lakers for heavy bulk commodities or with land transportation modes (rail, truck) for many other types of cargo.

- Advocates feel tug-barges are economically feasible, because of smaller crew size (6-12 people), lower fuel and maintenance costs, greater operational flexibility, less inspection regulations, accessibility to more ports, and lower construction costs than for a conventional ship.

- Others believe that tug-barge services could be profitable but no capital is available for investing in new vessels when there are so many ships laid up now and freight rates are so low.

- A number of those interviewed are doubtful that there is enough potential cargo suitable for tug-barge movement to support new tug-barge services.

- Tug-barges have been proven to be economically viable in certain areas such as the transportation of petroleum products and building materials (e.g., cement powder, some lumber products)

- Tug-barges may be more economical than conventional ships for short distances where savings in crew costs outweigh lower speeds.

b) Economic Feasibility (Continued)

- Need to look at economies of particular service to determine economic feasibility of tug-barge operations; lack of current, detailed studies.

- Lock and pilotage fees work against any new marine services.

- Unions would be opposed if tug-barges replace regular ships having larger crew requirement; would possibly be in favour if cargo to be hauled is normally transported via rail or truck.

- Many people cited complacency and conservatism of Great Lakes shipping industry as a major problem in establishing any new marine services.

- Lack of awareness works against greater use of tug-barges; shippers do not consider them in particular, nor the marine mode in general.

- Signs of new interest in tug-barge services; several agencies and firms are examining possible opportunities.

- Several those interviewed feel greater consideration will be given to conversion of laid-up conventional ships to barges in order to reduce manning requirements and to increase flexibility of operations.

c) Container Feeder Service

- Booz, Allen & Hamilton studies (1985) suggested some potential for a U.S. Flag container feeder service using a tug-barge system; would depend on obtaining adequate volume of cargo, finding an alternative shipping mode during winter months when seaway closed and the pricing reactions of competing modes, particularly rail.

- St. Lawrence Seaway Development Corporation promoted the concept but has not found anybody willing to attempt the service.

- Previous attempts to move containers by conventional ships failed because of lack of cargo.

- The persons interviewed offered little support for this service; many feel it is not viable at this time due to rail and truck competition, lack of year-round service, slow transit time and potential costs of second tug requirements through locks and in harbours.

c) Container Feeder Service (Continued)

- Flag regulations (e.g., Jones Act) and coasting restrictions may also work against feeder service.
- Custom-built barges required to meet vessel size restrictions imposed by seaway.
- Rapid movement of containers by rail or truck preferred in an era of just-in-time inventories; but time sensitivity of containers may be overrated.
- Concept may become viable in future if land transportation costs rise faster than those for marine transportation; would need committed cargo with a long contract.

d) Cross-Lake Service

- Majority feel that a tug-barge operation hauling tractor-trailer units across Lake Ontario has some potential, despite Oshawa-Oswego failure.
- Would require a regular and frequent schedule, effective marketing and a minimum 2-3 year start-up time to become profitable.
- Government grants may be needed to generate interest; industry claims it has no capital for such an investment.
- Could provide relief at highway border crossings.
- Several people feel the service is viable only with a Ro-Ro ship; others feel technology is available to design a Ro-Ro tug-barge system such as those which operate in the Caribbean but with ice-breaking capability.
- Intermodal cooperation is likely required; would complement existing transportation services (truck and rail).
- Possibility of conflicts between Canadian and American trucking regulations.
- Study needed to identify the types and amount of cargo flowing cross-border; compare transit times and cost of land mode versus marine mode (conventional ship and tug-barge); determine port locations on both sides of Lake Ontario; and assess conditions necessary to make service attractive to shippers.

e) **Fleet System**

- Consensus is that a multi-barge fleet system moving cargo between Great Lakes ports has limited potential because of high barge construction costs (including self-unloading equipment), insufficient volume of cargo, lack of year-round service, fairly high start-up costs, lower costs of shore storage vs. floating storage and too much idle time for barges.

- Sizeable minority feel a tug-barge fleet system could be economically viable but would require a regular schedule and assured cargo in both directions.

- MAR-AD considered this concept several years ago, but it was shelved.

- Some potential for smaller sized cargoes to smaller ports; market abandoned by the phasing out of small freighters.

- Many feel that the market is already efficiently served by land transportation network.

f) **Potential Markets**

- Current tug-barge services on the Great Lakes include movement of lumber, cement, petroleum and petroleum products, molasses, salt, chemicals and salvage operations. (Exhibit 1)

- Tug-barge operations hauling lumber products out of Northern Ontario could be profitable but limited by low freight rates, railway competition, U.S. lumber tariffs and lack of year-round service.

- Tug-barges are unlikely to be competitive with lakers for hauling bulk commodities in large volumes; some potential for smaller cargos (7,000 - 15,000 ton range).

- General cargo no longer viable by marine mode as time of such importance today (e.g., just-in-time inventories).

- Tug-barge operations have potential for certain niches:
  - dedicated service between two ports
  - medium sized cargo markets/ports
  - specialized and odd-shaped cargo (lumber, petroleum products, chemicals)
  - specialty project moves (e.g.: Ontario Hydro generators)
  - low value, non-time-sensitive cargo to out-of-way destinations
  - Market once served by small bulk carriers for small ports.

4. NEED FOR A DETAILED EVALUATION

- Majority of those interviewed (75%) in favour of a detailed study; feel that a study is needed to prove the feasibility and profitability to the shipping industry which is very conservative. Those opposed believe that a tug-barge service is not viable on a large scale, particularly with current economic conditions; no industry interest.

- Any detailed study must include discussions with the tug-barge industry, not just with the large carriers.

- No recent public Canadian studies. Several private studies carried out by carriers and consultants, but are considered confidential.

- Those in favour feel a detailed study should include:

  - detailed outline of existing tug-barge services (companies, cargo, equipment and market served).

  - detailed cargo analysis to determine market potential of tug-barge services

  - feasibility analysis of specific tug-barge services (cross-lake, multi-barge fleet, specialized)

  - evaluation both technical and economic, of major types of tug-barge systems, including new systems not yet tried on the Great Lakes

  - comparison of tug-barge systems and conventional ships (manning requirements, acquisition and operating costs, performance, appropriate cargo)

  - comparison of tug-barges and competitive land transportation modes (rail and truck) using various scenarios

  - potential for conversion of laid-up conventional ships to barges

  - Coast Guard and Great Lakes system requirements for tug-barges

4. NEED FOR A DETAILED EVALUATION (Continued)

- anticipated union response to expanded tug-barge operations

- appraisal of government involvement in development of new tug-barge services

o Findings should be made readily available to shipping industry to generate interest and dispel misconceptions.

5. CONCLUSIONS

o Certain tug-barge services have been proven to be technically feasible although many in marine industry feel otherwise.

o Economic feasibility, other than for specialized uses, needs to be proven.

o Lack of detailed, current studies.

o New technological developments in tug-barge operations need to be examined to determine their viability on the Great Lakes.

o Lack of risk capital and initiative restraining development of any new marine services.

o Rail competition cited by many of those interviewed as a major limiting factor in the movement of goods by the marine mode in general, and by tug-barge in particular.

o A tug-barge container feeder service is not viable at this time.

o Cross-lake service, using a tug-barge operation, merits further study.

o A multi-barge fleet system has limited potential.

o A detailed study of the potential for tug-barge services is favoured by majority of those interviewed.

6. POSSIBLE FUTURE ACTION

- Conduct detailed study of the potential for new tug-barge services on the Great Lakes.

- The initial stage should involve a detailed cargo analysis to determine the market potential for new tug-barge services (rail and truck) using various scenarios:
  - potential for conversion of laid-up conventional ships to barges
  - Coast Guard and Great Lakes-St. Lawrence Seaway requirements for tug-barges
  - anticipated union response to expanded tug-barge operations
  - appraisal of government involvement in the development of new tug-barge services.

- Firms that have carried out previous studies of tug-barge services, should be requested to provide the reports after editing of confidential information.

- The findings could be disseminated to the shipping industry to create interest in the marine mode in general, and tug-barge services in particular.

EXHIBIT I

A PARTIAL LIST OF GREAT LAKES

TUG-BARGE SERVICES

COMPANY	EQUIPMENT	CARGO	MARKET
Great Lakes Marine Contracting Ltd; St. Catharines, Ontario	1st Generation Tug-Barge System	Molasses	Oswego, New York to Hamilton & Toronto
J.W. Purvis Marine Ltd; Sault Ste. Marie Ontario	1st Generation Tug-Barge System	Salvage & Construction	Great Lakes
A.B. McLean & Sons Ltd; Sault Ste. Marie Ontario	1st Generation Tug-Barge System	Lumber	Thunder Bay to Windsor
St. Mary's Cement Ltd.;Bowmanville, Ontario	2nd Generation Self-Unloading Barge; Tug owned & Operated by Merce Transportation Ltd. Toledo, Ontario	Cement Powder	Detroit to Terminals along Lake Michigan
St. Lawrence Cement Company; Mississauga, Ontario	Owns a 2nd Generation Self-Unloading Barge; Leases Tugs	Cement Powder	Lakes Erie & Ontario
McAsphalt Industries Ltd; Toronto, Ontario	1st Generation Tug-Barge System	Asphalt	Great Lakes & East Coast (e.g., Sarnia to Prince Edward Island)
McKeil Work Boat Ltd; Winona, Ontario	1st Generation Tug-Barge System	Sand, Stone, Lumber & Large Machinery	Great Lakes & East East Coast (e.g., Lumber from Thunder Bay to Windsor
Hannah Marine Corporation; Burr Ridge, Illinos	1st & 2nd Generation Tug-Barge Systems; Also a 3rd Generation Articulated Tug-Barge	Liquid Bulk (Oil & Chemicals) Sand & Slag	Lakes Huron, Michigan and Erie
Canonie Transportation Ltd. Muskegon, Michigan	2nd Generation Tug-Barge System	Oil & Asphalt	Lakes Huron, Michigan and Erie

EXHIBIT I (Continued)

COMPANY	EQUIPMENT	CARGO	MARKET
Great Lakes Towing Company; Cleveland, Ohio	Owns Tugs; Leases Barges as needed	Cement, Grain, Petroleum Products, Scrap Metal and Large Machinery	Great Lakes
Medusa Cement Company; Cleveland, Ohio	Self-Unloading 2nd Generation Barge (converted Tanker); Tug owned and operated by Hannah Marine Corp.	Cement Powder	Great Lakes
Windsor-Detroit Barge Line Inc.; Detroit, Michigan	1st Generation Tug-Barge System	Railway Cars	Windsor-Detroit
Norfolk & Western Railway; Detroit, Michigan	1st Generation	Railway Cars	Windsor-Detroit

ATTACHMENT #1

PERIODICALS

Bulk Systems International
Canadian Shipping and Marine Engineering
Canadian Transportation and Distribution Management
Cargo Systems International
Chilton's Distribution
Great Lakes Red Book
Greenwood's Guide to Great Lakes Shipping
Fairplay International Shipping Weekly
Handling and Shipping Management
Marine Engineering/Log
Seaports and the Shipping World
Seaway Review
Seafarer
Traffic World
Transport 2000 and Intermodal World
WWS/ Worldwide Shipping

ATTACHMENT #2

REPORTS

* ARCTEC Incorporated. Great Lakes/St. Lawrence Seaway Fleet Mix, prepared for U.S. Dept. of the Army, Columbia, Maryland, 1981.

* Booz, Allen and Hamilton Inc. Transportation Cost Analysis of the St. Lawrence Seaway, prepared for St. Lawrence Seaway Development Corporation. Washington, D.C. 1985

* Booz, Allen and Hamilton Inc. Cost Analysis of Alternative Great Lakes Feeder Systems, prepared for St. Lawrence Seaway Development Corporation. Washington, D.C. 1985

* Canadian Transport Commission, Research Branch: Can Boat Compete for Rail and Truck Traffic? Ottawa, 1986 (Report WP 30-86-08)

* Elste, Volker H.; Swigart, James E. and Swift, Peter M. Transport Analyses: Great Lakes and Seaway, Vol. III: Seaway Transport and Overseas Trade. University of Michigan, Department of Naval Architecture and Marine Engineering, Ann Arbor, Michigan, 1974. (Report No. 160)

* Ontario Ministry of Transportation and Communications, Transportation Pricing Studies Section; The Great Lakes Deckhouse Barge Study, Toronto, 1974

* Ontario Ministry of Transportation and Communications, Marine Office; Marine Innovation Ideas, prepared for the Great Lakes/St. Lawrence Maritime Forum. Toronto, 1987

* Scher, Robert; Technical and Economic Feasibility of Multibarge Operations in Open Water. University of Michigan, Department of Naval Architecture and Marine Engineering, Ann Arbor, Michigan, 1976. (Report No. 187)

* Transport Canada, Marine Transportation R&D Advisory Board; Listing of Canadian Marine R&D Projects, 1980. Ottawa, 1981

* Tripp, C.E. and Plude, G.H. Integrated Tug-Barge Versus Ship - An Economic Comparison for the Great Lakes. Paper presented to the Society of Naval Architects and Marine Engineers, Spring Meeting. Chicago, Illinois, May, 1974

* Wright, Christopher; Large Tug/Barge Systems- An Overview. Paper presented to First North American Tug-Barge Conference. Vancouver, B.C. May, 1973.

ATTACHMENT #3

AGENCIES/FIRMS - INTERVIEWED

CANADA

A.B. McLean & Sons Ltd.
Toronto Harbour Commissioners
Lakehead Harbour Commission
Algoma Central Railway
Lea Mac Exporters Inc.
Fednav Ltd.
Misener Shipping Ltd.
Dominion Marine Association
Hamilton Harbour Commissioners
Shoreline Engineering Ltd.
Great Lakes Marine Contracting Ltd.
St. Lawrence Seaway Authority
Canada Steamship Ltd.
J.W. Purvis Marine Ltd.
Great Lakes Waterways Development Association
York University/University of Toronto Joint Program
Upper Lakes Shipping Ltd.
Acres International Ltd.
Transport Canada - Marine
DeWin
St. Mary's Cement Ltd.
St. Lawrence Cement Company
McAsphalt Industries Ltd.
McKeil Work Boat Ltd.
Oy Finnlines Ltd.

UNITED STATES

American Metal Bearing Corporation
Great Lakes Commission
International Association of Great Lakes Ports
Seaway Review Magazine
Saint Lawrence Seaway Development Corporation
University of Michigan
Michigan State University
U.S. Department of Transportation-Maritime Administration
Hannah Marine Corporation
Canonie Transportation Ltd.
Merce Transportation Company
Great Lakes Towing Company